



ElettroMagnetic Services
SRL



COMPANY PRESENTATION



www.elettromagneticservices.com

www.antennacustomizer.com



HISTORY AND COMPANY PROFILE

History and company profile

Founded in 2001 by two skilled partners who previously worked in R&D department of other telecommunications companies, **ElettroMagnetic Services s.r.l.** has a strong background in design and manufacturing solutions in the field of antennas and wireless systems, carrying out development, engineering and production activities by its own.

In 2005 the company moved into the bigger facility in Vailate, near the new A35 highway (the "Bre.Be.Mi") linking Brescia to Milan, in the north-west part of Italy.

In this plant an RF laboratory with an anechoic chamber and a mechanical workshop have been accomplished to enhance the core business of the firm, i.e. the capability to carry out new antenna designs.

This activity, which distinguishes **ElettroMagnetic Services s.r.l.** from its competitors, consists in building customized antennas with particular specifications, according to Customer's needs. In this area several projects have been completed, working with big manufacturing companies and also with universities and research institutes.

The company's main areas of action are the following ones:

- **Antennas for mobile radio services (GSM, UMTS, LTE, 3G/4G, 5G, ...);**
- **Customized antennas for military applications (SATCOM, jamming, Electronic Warfare Systems, ...) mobile, marine or fixed;**
- **Customized wireless networks antennas (Wi-Fi IEEE802.11x, MIMO, ...);**
- **Special antennas for motorsport and marine applications;**
- **Special antennas for Smart Metering applications (ISM bands of 169 MHz, 433MHz, 868 MHz, LoRa, ...);**
- **Customized GPS and GLONASS antennas;**
- **Customized radar antennas (SAR, BiRaLeS, GPR, ...);**
- **Customized Antenna Arrays;**
- **Customized UWB antennas;**
- **Customized Submersible Antennas;**
- **Multiband, Sectorial, Dual Polarized, Bidirectional Antenna Systems;**
- **Customized antennas for electro-medical RF diagnostic apparatuses;**
- **R&D of smart antennas with reconfigurable beam pattern;**
- **Integrated Antennas.**





ATTENZIONE
SCELTA DELLA VELOCITÀ
PRIMA IN FUNZIONE

	A	B		
L	300	160	280	480
H	350	180	300	500

Q₂ (mm)

Weida

WARNING
Attention to rotation
when spindle speed is
above 100 rpm.

WARNING
To prevent injury, handle the work
piece with care and do not touch the
spindle when the machine is running.

È OBBLIGATORIO
PROTEGGERE
GLI OCCHI

ANTENNA CUSTOMIZER

AntennaCustomizer

This term synthesizes the core business of the company i.e., the research and development standardized method to manufacture antennas with particular electrical and mechanical specifications to suit any customer's request.

The acquired experience in this specific field has allowed us to define a fast and effective design procedure by which we can provide innovative products, in a quick and cost-effective way, even for all those applications where a tailored solution seems to be impracticable.

The **AntennaCustomizer** development activity is carried out through four steps, plus a possible production phase in the case that our customer will require this further service from us.

Step 1

Definition of the technical specifications and quote



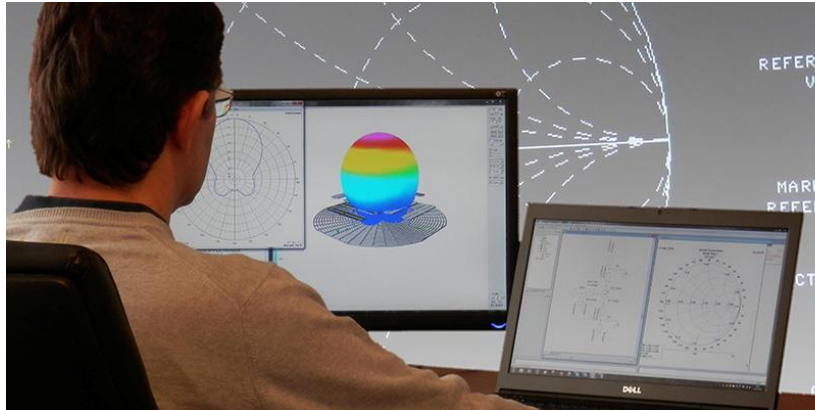
All projects start with a first phase of dialogue, absolutely not binding, that aims to put in evidence the specific needs of the Customer, in order to identify the proper solution. Depending on the particular application, we assess the electrical and mechanical specifications of the novel antenna, trying to give at each of them the correct weight in relation to project complexity.

Since this is a very delicate stage, we are available to arrange a free, open-ended meeting to answer all your questions and clarify any doubt.

At the end of this first phase, we will draw up a document showing the technical specifications we are able to guarantee, with delivery time and design cost.

Step 2

In-depth technical proposal



Before starting with the design activity, we propose a step called ***In-depth Technical Proposal***.

This document must be considered as a stand-alone activity, non-mandatory and non-binding and it has the following aims:

- To supply a technical advice about the required project
- To analyze in-depth the technical details we consider more relevant
- To identify the rough edges that could be met during the design activity
- To supply a detailed description of the developing process phases

In this way, it will be possible to highlight any discrepancies and/or missing or incomplete data and verify that all the information have been transposed correctly.

Step 3

Antenna development



We proceed with the development of the novel antenna using both electromagnetic simulation tools (for the electrical design) and CAD software (for the mechanical design). In the case that some preliminary laboratory tests are needed for a direct validation of design choices, all the required measurements can be easily carried out thanks to the RF laboratory and the mechanical workshop, located inside our facility.

Then we proceed further on with the assembly of your first prototype. If some specific parts are needed, we can get them quickly from a network of specialist suppliers, under our total control. The experience allow us to reduce time and costs for pre series accomplishment.

When the assembly is completed, the prototype is carefully measured in order to verify its real correspondence with the formerly assessed specifications. The prototype will be validated only after this confirmation.

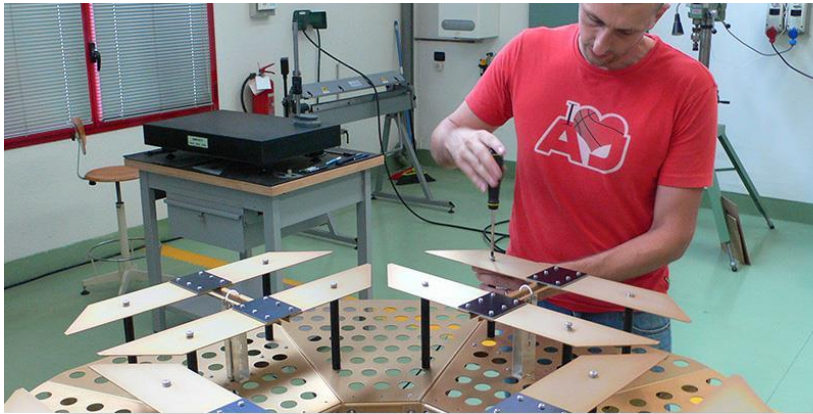
Inside our facility, our electromagnetic measurements laboratory is equipped with an anechoic chamber, a fully automated data acquisition system and all the instruments to carry out a complete and accurate characterization of the new antenna, both as a stand-alone product or integrated into a particular electronic device.

All the requested prototypes are manufactured and individually measured in order to verify the correct operation.

At the end, all the prototypes are delivered together with one or more technical reports containing the results of all the characterization measurements.

Step 4

Production and after-sales service



At this stage, we are able to arrange a production and to supply the new antennas as mutually agreed with the following advantages:

- Defined delivery times
- Fixed and guaranteed price
- The certainty that the product will not be proposed or commercialized to other companies.

Furthermore, we will be available for any tips and tricks on correct installation and maintenance, in order to obtain the best results.

If, over time, some changes should be required, we will be able to accomplish every required improvement.



A photograph of a metal enclosure, likely a microwave or millimeter-wave device. The enclosure is open, revealing a green printed circuit board (PCB) on the left side. The PCB has several gold-colored components and a central vertical strip. A brown cable is connected to the bottom of the PCB. The main interior of the enclosure is a dark metal surface with a grid of 12 circular recessed areas, arranged in 3 rows and 4 columns. These are integrated antennas. The text "INTEGRATED ANTENNAS" is overlaid in red on the right side of the image.

**INTEGRATED
ANTENNAS**

Integrated antennas

What “integrated antenna” means

With the term “**integrated antenna**” we mean a highly customized and optimized product that can be inserted into a proprietary electronic device (hosting device) or covert into a specific location to suit a particular application.

The main features of an integrated antenna, that also distinguish its development process from a more conventional design, are the following ones:

- The electrical parameters cannot be assessed without placing the antenna into its operating condition, i.e. an integrated antenna cannot be conceived as a stand-alone element since all the hosting device affects radiation;
- Unconventional, compact schemes of radiating elements are used in design, since severe limitations and mechanical constraints occur in the hosting device;
- Some lossy elements are often present in the electronics or materials of the hosting device, therefore the project must include measures to minimize these effects on antenna efficiency.

In these last years some PCB mounted antennas, both conventional and SMD, appeared in the market with the intent to provide a universal plug-in component for RF integrated systems and wireless devices.

The “plug & play” property of these products is often overestimated, since the declared electrical properties are measured by means of the manufacturer's evaluation board that in most cases differs substantially from the real PCB of the hosting device.

PCB size and shape, nearby electronic components and wirings, dielectric housing and metallic hardware are all factors that can detune the antenna and severely impair its capability to radiate and receive wireless signals.

Here at [ElettroMagnetic Services s.r.l.](#) we **do not** supply you an off-the-shelf integrated antenna that can reveal unpredictable performance when fitted in your particular application.

Here at [ElettroMagnetic Services s.r.l.](#) we follow your product development and we can design a specifically designed integrated antenna, to achieve the optimal performance for your hosting device.

Development of an *integrated antenna*

According to our proven **AntennaCustomizer** method, we can carry out an integrated antenna development process in the form of a comprehensive service to the Customer.

First...

we can submit to our customer a free preliminary technical proposal with detailed explanations about the possible solutions we can accomplish to develop the right antenna for his integration needs.

Second...

we can collaborate with our customer's technical office to take into account also the "electromagnetic factor" of his design i.e., components placement, materials choice, cables routing and other critical aspects to achieve maximum antenna performance.

Third...

we can develop the novel antenna directly in the Customer's hosting device, carrying out both electromagnetic simulations and electrical measurements of the real antenna parameters, thanks to our internal laboratory and mechanical workshop.

Fourth...

we can supply to our customer the complete characterization of the integrated antenna carrying out measurements in its definitive operating position, i.e. in the hosting device: a large number of measurements can be accomplished, according to Customer's product specifications and applications.

Fifth...

we can carry out both prototyping and engineering of the novel integrated antenna, that can be directly manufactured by our customer or supplied to him in quantities for production purposes.

Sixth...

we can support our customer further on production, if some changes, upgrades or modifications are needed during all product's life.





**MILITARY
ANTENNAS**

Military antennas

In recent years, a constantly growing part of our core business has been dedicated to the military sector, where our concept of customized antennas can be effectively declined in various new solutions: most installations use antennas that require specific constraints in mechanical, environmental and electrical specifications.

We can proudly assert that all our designs have been developed with the aim to supply novel solutions in all such applications where standard products were not usable.



In this field of application, we have already studied, developed and produced various antennas for terrestrial, marine and aircraft use, such as:

- compact HF antennas for marine LOS, BLOS, NVIS communications systems;
- UWB sectorial antennas for Electronic Warfare Systems;
- high gain directional UHF-SATCOM arrays;
- omnidirectional UHF-SATCOM compact antennas for marine and terrestrial use;
- broadband VHF-UHF systems for naval applications;
- directional antennas for jamming systems;
- UHF conformal antennas to be embedded into aircrafts fuselage;
- multiband antennas for unmanned submersible boats.





**ANTENNA TESTING
AND
MEASUREMENTS**

Antenna testing and measurements

Since its founding in 2001, both time and money have been constantly invested to enhance the measurement equipment in **ElettroMagnetic Services s.r.l.** own internal laboratory.

This has been accomplished with the twofold aim to pursue a more efficient development procedure and to give a complete specifications assessment of all our products.

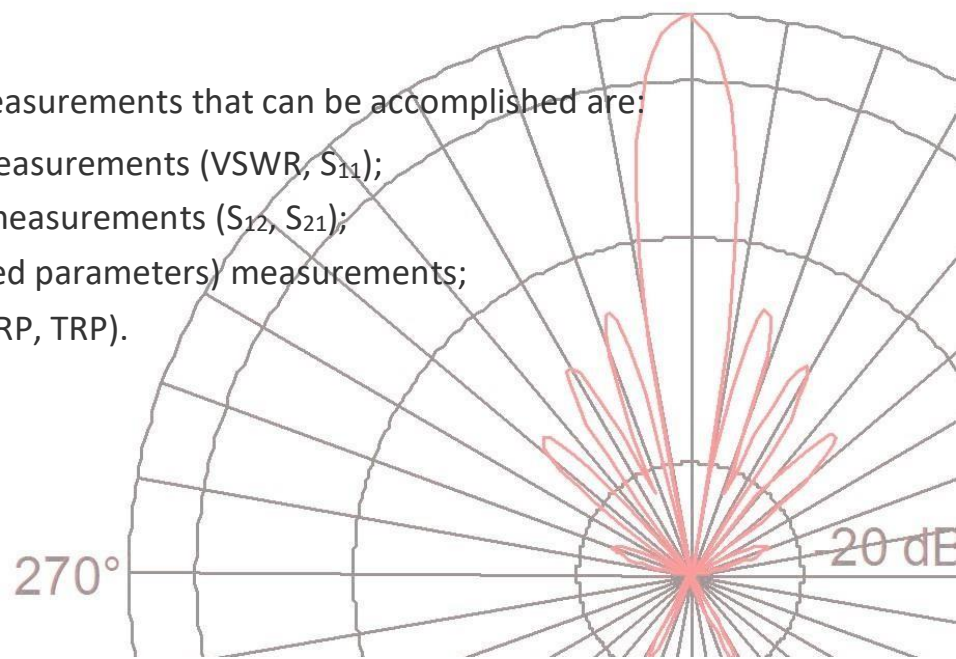
Now the company's laboratory includes an anechoic chamber with a fully automatic acquisition system that drives a rotary platform capable of a position accuracy down to 0.1 degrees. In this way it is easy to carry out precise radiation measurements also on antennas that are integrated into large housings or subsystems.

A complete set of measuring instruments (VNA, spectrum analyzer, RF signal generator, etc.) is part of the whole system, so it is possible to acquire a full characterization of antenna's electrical parameters.

In the case of integrated antennas that are mated to a RF source, direct radiated power measurements are also possible to determine the real performance of the whole system.

Some of the most important measurements that can be accomplished are:

- Impedance and reflection measurements (VSWR, S_{11});
- Insertion loss and isolation measurements (S_{12} , S_{21});
- Radiation pattern (and related parameters) measurements;
- Radiation measurements (EIRP, TRP).



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